TITLE: Cultural Resources Study for the Preparation of an Environmental Impact Statement, U.S. Army Transformation of the Second Brigade of the 25th Infantry Division (Light) to a Stryker Brigade Combat Team, Various Sites, Hawaii (Revised Draft)

AUTHOR: Descantes, Christophe, Ph.D and David J. Welch, Ph.D., International Archaeological Research Institute, Inc.

DATE: February 4, 2003

EXHIBIT 83

— REVISED DRAFT —

CULTURAL RESOURCES STUDY FOR THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT U.S. ARMY TRANSFORMATION OF THE SECOND BRIGADE OF THE 25TH INFANTRY DIVISION (LIGHT) TO A STRYKER BRIGADE COMBAT TEAM, VARIOUS SITES, HAWAI'I

By

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prepared for:

U.S. Army Garrison, Hawai'i
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under Contract No. DACA65-99-D-0065 with

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February 4, 2003

STRYKER BRIGADE TRAINING

Training will be conducted at KTA by units of the Stryker Brigade. In general this training will involve the same size of units and the same training activities as are being carried out by the army at KTA currently. However the units will use Stryker vehicles, which have the potential of affecting sites in ways that current maneuvers do not and causing damage to cultural resources. In the absence of constraint maps at present, it is currently assumed that the Stryker vehicles may use all of the base for training. In that case, training at DMR has the potential of adversely impacting the following sites that are potentially eligible for the NRHP (Table 13) as well as yet unidentified sites in areas that have not been surveyed.

Table 13. Potentially eligible sites at KTA that might be impacted by unconstrained Stryker Vehicle Training.

Training Area	State Site No.	Site Type	ID
KTA	50-80-02-0259	spring	Waikane Stone
KTA	50-80-02-0260	heiau	Pu`uala Heiau (4930 terrace facing)
KTA	50-80-02-0599	bunkers	3 bunkers at Punamano Communication Station
KTA	50-80-02-1043	complex	Kawela agricultural terraces
KTA	50-80-02-2357	wall	plantation era stone wall remnant
KTA	50-80-02-2358	single feature	house site 13m x 10m
KTA	50-80-02-2359	2 adj. Terraces	terraces 22.5m x 6m
KTA	50-80-02-2360	single feature	terrace 20m x 10m
KTA	50-80-02-2501	heiau	Hanakoae Platform 4m x 7m
KTA	50-80-02-4881	concrete slab	military octagonal concrete slab (ob. Post) 4m
KTA	50-80-02-4882	bunker	military bunker 8.7m x 4.5m
KTA	50-80-02-4883	historic housesite	plantation era house site
KTA	50-80-02-4884	imu	Imu site 3m
KTA	50-80-02-4885	heiau	Pahipahialua Heiau 17m x 12m
KTA	50-80-02-4886	bunker	pentagonal military bunker 3.5m x 3m
KTA	50-80-02-4887	complex	hab. complex w/ related ag. Features 24m x 14m
KTA	50-80-02-4888	wall/depressions	ag. earthen depressions/rock alignment 20m?
KTA	50-80-02-4930	linear mound	linear rock mound (remnants Site 260?) 7mx2m
KTA	50-80-02-5534	rock shelter	temp. shelter 5m x 2.5m
KTA	50-80-02-5535	burial cave	burial cave 8m x 6m
KTA	50-80-02-5536	rock shelter	temp. shelter? 15m x 3m
KTA	50-80-02-5537	enclosure	enclosure (pre-contact) 62m x 40m
KTA	50-80-02-5538	wall	wall (pre-contact) 15m x 1m
KTA	50-80-02-5539	terraces	retaining wall & stone concentration 40m x 20m
KTA	50-80-02-5540	terraces	terraces 15m x 15m
KTA	50-80-02-5684	enclosure	enclosure 50m x 25m
KTA	50-80-02-5685	rock shelter	temp. shelter 9m x 5m
KTA	50-80-02-5686	ahupua`a boundary	wall 4m x 1m
KTA	50-80-02-5688	roadway	historic roadway 30m x 6m
KTA	50-80-02-5689	bunker	underground bunker 3m x 2m
KTA	50-80-02-5690	enclosure	bunker 4m x 3m
KTA	50-80-02-9506	historic irrigation	Kea`aulu Ditch (hist. stone faced irr. ditch)

Training Area	State Site No.	Site Type	ID
KTA	50-80-02-9507	(historic?) terrace	ʻOʻio Stream terrace (ag. terrace)
KTA	50-80-02-9508	platform	East ʻOʻio Gulch platform (stepped stone plat.)
KTA	50-80-02-9509	complex	ʻOʻio Gulch complex (ag. terraces)
KTA	50-80-02-9517	terraces	Kanealii agricultural terraces (poss. remnants)
KTA	50-80-02-9745	landmark	ʻOpana Mobile Radar Site
KTA	temp 1	enclosure	RD-1 military defense enclosure 20m x 15m
KTA	temp 2	enclosure	AD-1 military defense enclosure 8m x 5m
KTA	temp 3	enclosure	AD-4 military defense enclosure
KTA	temp 4	enclosure	SC-1 military defense enclosure 4m x 3.5m
KTA	temp 5	survey marker	SC-2 1927 Bench Mark/Survey Station w/ encl.
KTA	temp 6	survey marker	MR-1 1933 Bench Mark/Survey Station

KAWAILOA TA

The Stryker Brigade Combat Team will conduct training at KLOA, but training activities will be restricted to those activities being conducted under current training. Thus the only potential new adverse effects would be those that would accompany increased use of the area.

Archaeological survey has been conducted of selected survey areas within KLOA, primarily in the gulches in the west portion of the project area. Seventy-nine archaeological sites have been identified within KLOA. Several of these sites should be treated as potential traditional cultural properties. Table 14 lists the currently identified sites within KLOA that are potentially eligible for the NRHP.

Table 14. Potentially eligible sites at KLOA.

Training Area	State Site No.	Site Type	ID
KLO	50-80-04-5634	wall complex	3 retaining walls/ 1 align
KLO	50-80-04-5635	single lava tube	lava tube
KLO	50-80-04-5637	single trail	Kawailoa Trail
KLO	50-80-04-5638	single trail	Koʻolau Summit Trail
KLO	50-80-05-2337	rock shelter	
KLO	50-80-05-2343	complex	
KLO	50-80-05-2344	rock shelter	
KLO	50-80-05-2345	irrigation complex	
KLO	50-80-05-2346	irrigation complex	
KLO	50-80-05-2347	burial cave	
KLO	50-80-05-2348	rock shelter	
KLO	50-80-05-2349	rock shelter	
KLO	50-80-05-2350	rock shelter	
KLO	50-80-05-2351	burial cave	
KLO	50-80-05-2352	rock shelter	
KLO	50-80-05-5605	path,terraces	historic path, dryland agriculture

TITLE: Final Environmental Impact Statement. Transformation of the 2nd Brigade, 25th Infantry Division (L) to a Stryker Brigade Combat Team in Hawaii

AUTHOR: U.S. Army, Office of the Secretary of the Army and US Army Corps of Engineers

DATE: May 1, 2004

Proposed Action (Preferred Alternative)

Significant Impacts

Impact 1: Soil erosion in training ranges. Training activities under the Proposed Action are expected to result in a significant increase in soil erosion and soils loss compared to existing conditions in the SRAA and in SBER. The soil loss may be partially but not fully mitigated. Therefore, this is considered to be a significant but not mitigable to less than significant impact.

The Army developed the ATTACC model, which is described in more detail in Appendix M-2, to assess the impacts of mounted maneuver training on land. The first step in using the model is to estimate the training load placed on the land by the vehicles that would be used to transport and accompany troops on maneuvers on the ranges. This training load is measured in terms of a standard based on the impact of an Abrams tank per mile of travel during maneuver training. The standard unit is called a maneuver impact mile (MIM). Other vehicles have different impacts on land condition due to their weight, wheel or track configuration, and how they are operated. The effect of mounted maneuver training on a particular plot of land can be generally described by a curve that relates the land condition to the training load. As the training load increases, the condition of the land would generally decrease because the training load damages vegetation cover and disturbs soils, and these effects can persist over time. Once initiated, damage to vegetation cover and soils can accelerate, as eroded areas widen, for example, and soil loss prevents vegetation from becoming reestablished. Mounted maneuver training is generally not restricted to roads but is restricted by terrain factors (slope and vegetation) and can be further restricted by the need to avoid sensitive habitat or cultural sites. Curves that relate land condition to training load can be developed for small areas based on detailed information about the susceptibility of the land to the effects of maneuver training, or they can be developed for larger areas, where the effects are not known in as much detail, but are averaged. ATTACC modeling was performed at this broader level of analysis for this EIS to estimate the overall effects of the Proposed Action relative to existing conditions for entire ranges.

In modeling the effects on the Schofield ranges, the existing annual training load at SBMR was estimated at 16,740 MIMs, and the existing training load in SBER was estimated at 11,680 MIMs. The training load at SBMR is confined to a small portion of the South Range that is accessible to vehicles. This includes unpaved roads and off-road areas. For the Proposed Action, the annual training load at SBMR would increase to 25,855 MIMs and the load at SBER would increase to 19,145 MIMs per year. The increase results from a combination of increased training intensity and the increased effects on land condition per mile of training with the Stryker vehicle. Land condition curves were developed for both SBER and SBMR. For SBMR, future training was assumed to be on the SRAA.

In both the SRAA and SBER, the ATTACC model results indicate that land condition would decline. In the SRAA, the land is currently used for pineapple cultivation. The pineapple fields would be left in place, and the Stryker vehicle would be restricted to existing farm roads. These roads are oriented in a grid pattern that allows access to the pineapple rows. In modeling the effects on the SRAA, the pineapple crop was assumed to be removed,

rock matrix by weathering. Earthquakes or vibrations from sonic booms may also trigger these failures (Jibson and Baum 1999). The rock rubble from these failures accumulates on the floors of the gulches and is ultimately carried downstream by runoff. The probability of earthquakes is about the same in KTA as it is elsewhere on O'ahu because most earthquakes are centered in the active volcanic areas beneath the Island of Hawai'i. The intensity of ground shaking, which is influenced by the underlying geologic materials, would be lowest in rocky upland areas and would probably increase somewhat on the lower slopes, where the thickness of the alluvial deposits is greatest.

Drum Road/Kawailoa Training Area

The route of Drum Road is mainly along ridges within KTA and alternates between ridges and gulches along the western boundary of the KLOA. The potential for slope failure is probably high on slopes underlain by saptolite (deeply weathered basalt that retains the appearance of the original rock but that does not have the strength of the rock). The saprolite forms steep slopes in stream gulches, but the slopes may be weakened if undercut ar the base or if overloaded on top.

7.9.2 Environmental Consequences

Summary of Impacts

Impacts on geology and soils from the Proposed Action and No Action are summarized in Table 7-19. Significant and unmitigable impacts would occur from erosion and soil compaction caused by off-road Stryker rraining and other ground-disturbing activities. Significant impacts mitigable to less than significant would occur from soil erosion caused by wildland fires. Less than significant impacts would occur from erosion and slope failure caused by use of Drum Road.

Proposed Action (Preferred Alternative)

Significant Impacts

Impact 1: Soil loss from training activities. In areas with steep slopes, the use of off-road vehicles and other ground-disturbing activities may reduce vegetative soil cover and alter drainage patterns, which could lead to gullying. Steep slopes occur on the margins of the CACTF. ATTACC modeling of the maneuver training areas suggests that the effects on land condition would be severe after the Proposed Action is implemented. As described in Chapter 5, Section 5.9, soil compaction may also affect vegetation recovery, and create preferred drainage pathways along which erosion may be enhanced. Compaction is likely to occur in moist soils containing clays. Together, these effects are expected to be significant. These impacts would occur in addition to the ongoing erosion stresses due to public access and unauthorized use of portions of KTA described for the No Action Alternative. The mitigation measures below will substantially reduce the impact but not to less than significant levels.

Graphics Code: S5
Project #: 57421
Project Title: Motor Pool
Project Location: SBMR
Project Size: 167,775 square feet of building space and 1,293,725 square feet (34 acres) of hardened surface
Construction Timeframe: September 2005 to September 2007

Background: Vehicle maintenance facilities at SBMR are inadequate to meet the requirements of the 2nd Brigade. The facilities do not meet Army standards due to deteriorated condition, substandard size, and failure to meet standard design. The additional demands from Army transformation will worsen these inadequacies.

Project Description: Construct a 167,775-square-foot motor pool facility, including new tactical equipment maintenance shops with repair bays; separate administrative area; shop control; overhead cranes; petroleum, oil and lubricants facilities; oil-water separators; hardstand and organizational vehicle parking areas; arms rooms; communication rooms; deployment storage facilities; hazardous material storage facility; and telecom shelter. Supporting facilities would include a new water tank on Trimble Road, sanitary sewer, storm drainage, electric service, phone system, exterior lighting, fire protection and alarm systems, paving, walks, curbs and gutters, parking, roadways, information systems, and site improvements. This motor pool would be sited on agriculture fields within the proposed SRAA. The USARHAW is conducting informal discussions with the owner to identify a location that is satisfactory to both parties and that reduces potential impacts. Two deployment storage buildings would be placed approximately 8,000 feet down Lyman Road.

Estimated Utility Requirements: The present power grid distribution system would be used and could provide the required additional power. It is expected to continue to be available. Estimated energy usage is 12,480,000 kilowatt hours per year. Air conditioning, estimated at 170 tons, would be provided by a chilled water system. Heating is not required. The existing water distribution system is adequate for domestic water flow and fire demand requirements, estimated at 17,600,000 gallons per year. The gravity sewer collection system is adequate. Telephone and LAN service can be had approximately 4,400 feet from the project site at the ISF. Approximately 1,000 feet of underground duct would be installed from the TEM 7 maintenance building to the I3A to provide connectivity for this project. The remaining buildings within the project requiring telecom services would be connected via an underground duct system to the TEM 7 maintenance building.

ATIC-ATML-LM
G. Weith
20 March 2003

INFORMATION PAPER

SUBJECT: Transformation Training Impact at USARHAW

1. General. In support of the U.S. Army -Hawaii Transformation Environmental Impact Statement (EIS) I was asked to identify the training impact of the current units stationed in Hawaii, estimate the training impact after transformation of the 2nd Brigade, 25th ID (L) to a Stryker Brigade Combat Team (SBCT), and compare the "before and after" results. The Army Training and Testing Area Carrying Capacity (ATTACC) methodology was the tool used to accomplish these tasks, as it had been used previously in support of the U.S. Army - Alaska and Fort Polk Transformation EIS.

2. Discussion.

a. A list of reference materials is at Enclosure 1.

b. Worksheets and graphs containing unit MIMs calculations and totals are at Enclosure 2.

c. The ATTACC Methodology quantifies the impacts of vehicles (Training Impact Factors) and training events (Event Severity Factors) in relation to a standard vehicle (M1A1 Tank) and event (Armor Battalion FTX). The result is a Maneuver Impact Mile (MIM). These factors were developed jointly with observer-controllers (O/C) at both CONUS Combat Training Centers. These factors were then linked to the (HQDA) Battalion Level Training Model (BLTM), which quantifies how many annual miles a specific vehicle in a specific unit will travel in specific training events. As a result, tables in the ATTACC Training Model (ATM) show the number of annual MIMs for almost all Army units.

d. Using the ATM tables, I calculated the annual MIMs for current 2nd Brigade, (8700) and the remaining 25 ID (L) units (40,200). Of those 40,200 MIMS, 15,500 belong to the Engineer Battalion (Cbt Hvy). A more thorough analysis of the Engineer Battalion's specific training events and training locations may reduce that number in both current

and future estimates. Additionally, I estimated the training impact for Army National Guard, Army Reserve and Marine Corps units that train in Hawaii. The current estimated total training impact for units training in Hawaii is 51,000 MIMs.

e. I reviewed the standard training records provided by the Range Facility Management Support System v. 3.5 (RFMSS) Training Utilization Reports. I reviewed these reports for the infantry battalions. I also discussed training locations with the Range Operations staff, using their training area maps. This helped identify specific training locations. As a result I allocated the MIMs as follows:

East Range	11,680
Schofield Bks	16,740
Dillingham	1710
Kahuku	7210
Pohakuloa (PTA)	13,660

f. Estimating future MIMs for a Transformed 2nd Brigade required several adjustments to the ATTACC Training Impact Factors, which measure the vehicle portion of the training load. In our previous analyses we gave the Stryker a Vehicle Severity Factor (VSF) of 0.86, equivalent to a M2 Bradley Infantry Fighting Vehicle. After reviewing the Light Armored Vehicle (LAV) Impact Studies (Ayers, et.al.) conducted in Yakima and Schofield Barracks, and discussing it with one of the authors and ATTACC Team member (A. Anderson) we concluded the Stryker vehicle severity more closely resembled that of a M113A3. The M113A3 VSF is 0.65. Not wanting to make a radical change, we adjusted the Stryker VSF to the midpoint, 0.75. We had also previously given the Stryker a Vehicle Off-road Factor (VOF) of 0.9, equivalent to a Bradley and the M113A3. In discussions with the USARPAC and USARHAW staff we concluded that the many limitations to off-road maneuver in Hawaii training areas would reduce the Stryker VOF to 0.6, equivalent to a HMMWV. This reduction in two vehicle impact factors reduced the total Stryker brigade training load (MIMs) by 20%.

g. The Stryker Brigade annual MIMs are 116,900 and the remainder of the 25 ID(L) units are 36,900 MIMs. The majority of the increase in the Stryker Brigade comes from the 3 transformed infantry battalions and the new RSTA Squadron. The total predicted training impact for

transformed units training in Hawaii is 155,900 MIMs. This is a three-fold increase over current training impact.

h. The next step in this process is the distribution of future Transformed training impact over Hawaii training lands. At the request of USARPAC and USARHAW staffs we included as available maneuver area the proposed 23,000 acre land purchase adjacent to PTA. After a discussion with the Transformation Office staff on a very preliminary Stryker Brigade training strategy, I was able to understand where platoon, company and battalion "unopposed" and force-on-force training would occur. Brigade size training will occur at one of the Combat Training Centers. As a result I allocated the MIMs as follows:

East Range	19,145	
Schofield Bks	25,855	Note 1.
Dillingham	4335	
Kahuku	13,770	
Pohakuloa(PTA)	30,931	
Keamuku	61,862	

Note 1. Schofield Bks includes the proposed South Range land purchase.

3. Conclusions. Through the use of the ATTACC Methodology and the process described in the previous paragraphs, we predict two significant increases in training impact, measured in MIMs, as a result of the Transformation of USARHAW forces. We predict the overall training impact to increase 3 times. We predict the training impact on the island of Hawaii (PTA + the proposed land purchase) to increase 7 times. As Stryker tactical and training doctrines emerge, we may find that a significant portion of the Stryker training is dismounted infantry training, which would reduce the training impact.

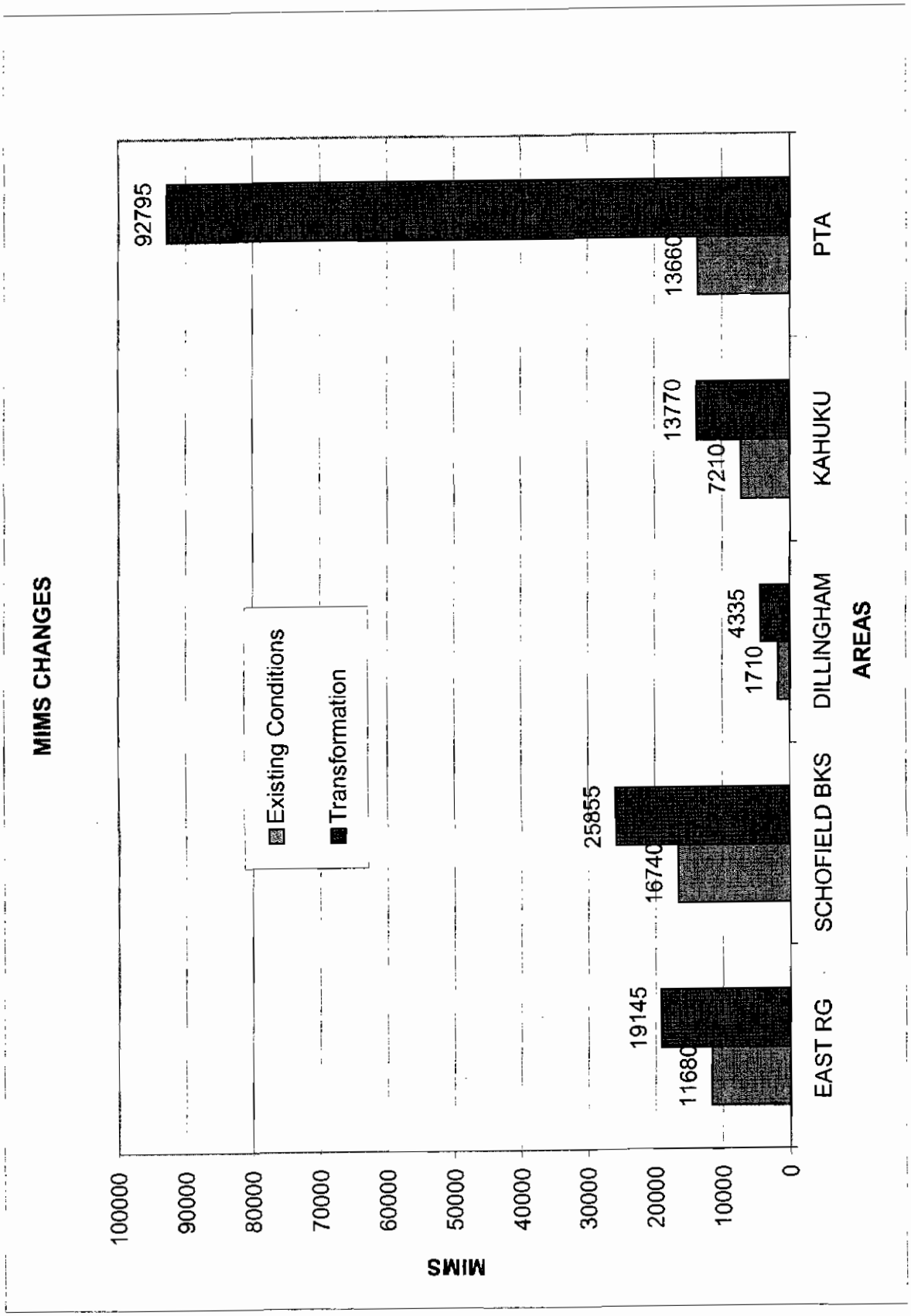
Enclosure 1 (References)

TC 25-1, Training Land, 21 June 2001.

U.S. Army Training and Testing Area Carrying Capacity (ATTACC) Handbook, Version 1.1, March 1999.

ATTACC Training Model, MIMs by UIC, July 1998.

Material provided by USARHAW staff, May 2002.
Organizational charts and vehicle densities.
RFMSS 3.5 Training Utilization Reports, Sept. 2001 - Sept. 2002


MIMS CHANGES
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Transformation
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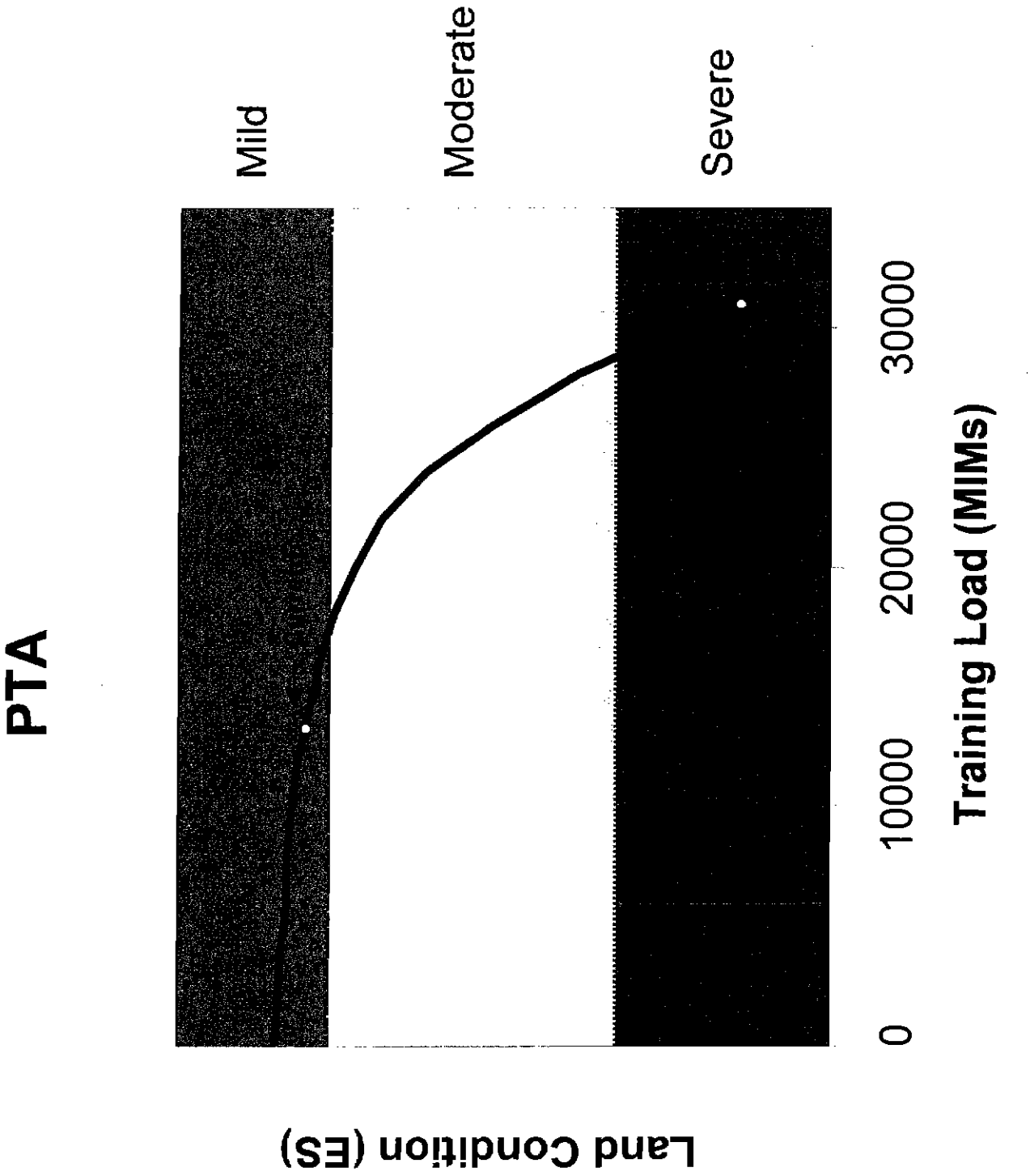
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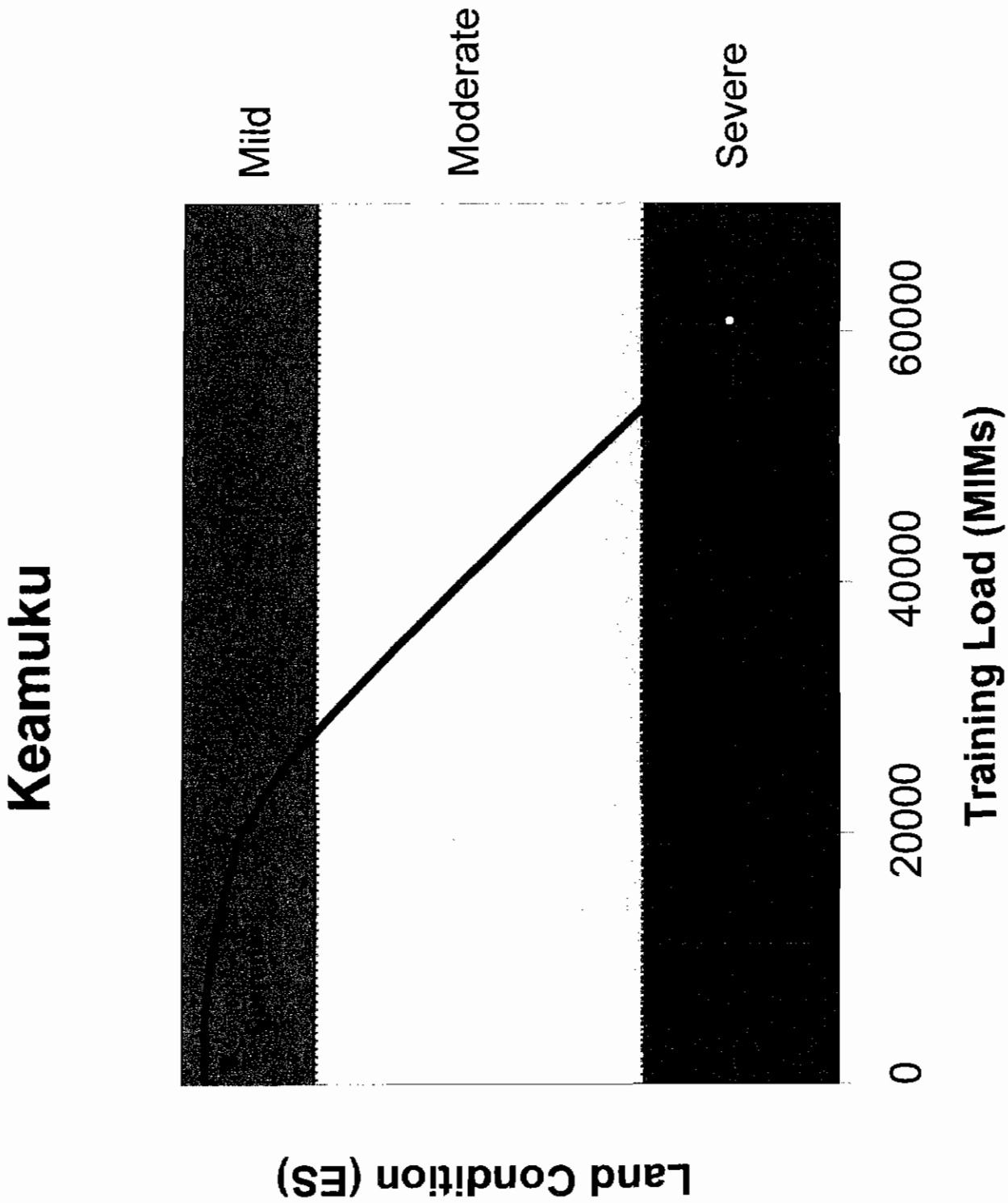
Land Condition (ES)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Severe
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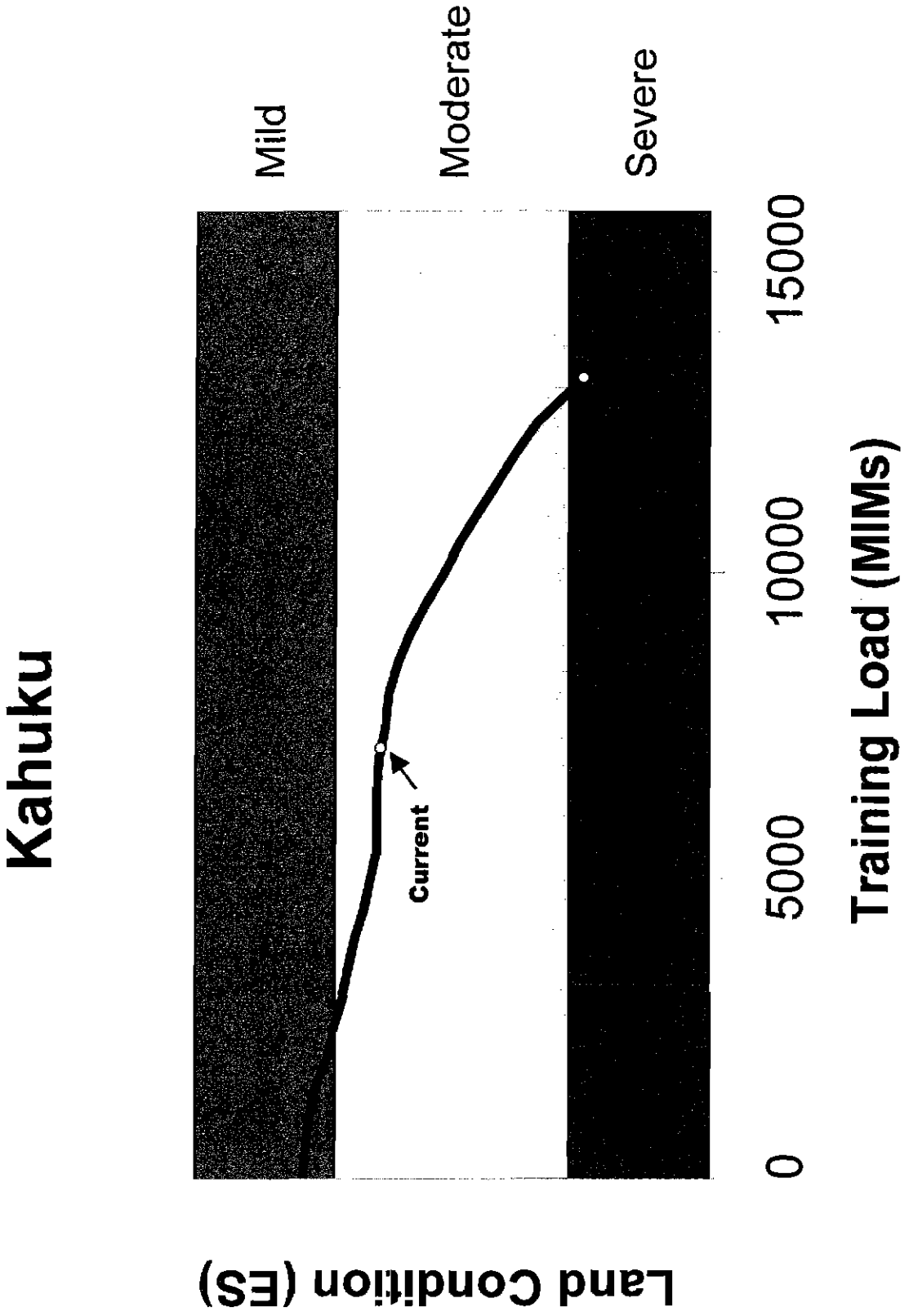
Training Load (MIMs)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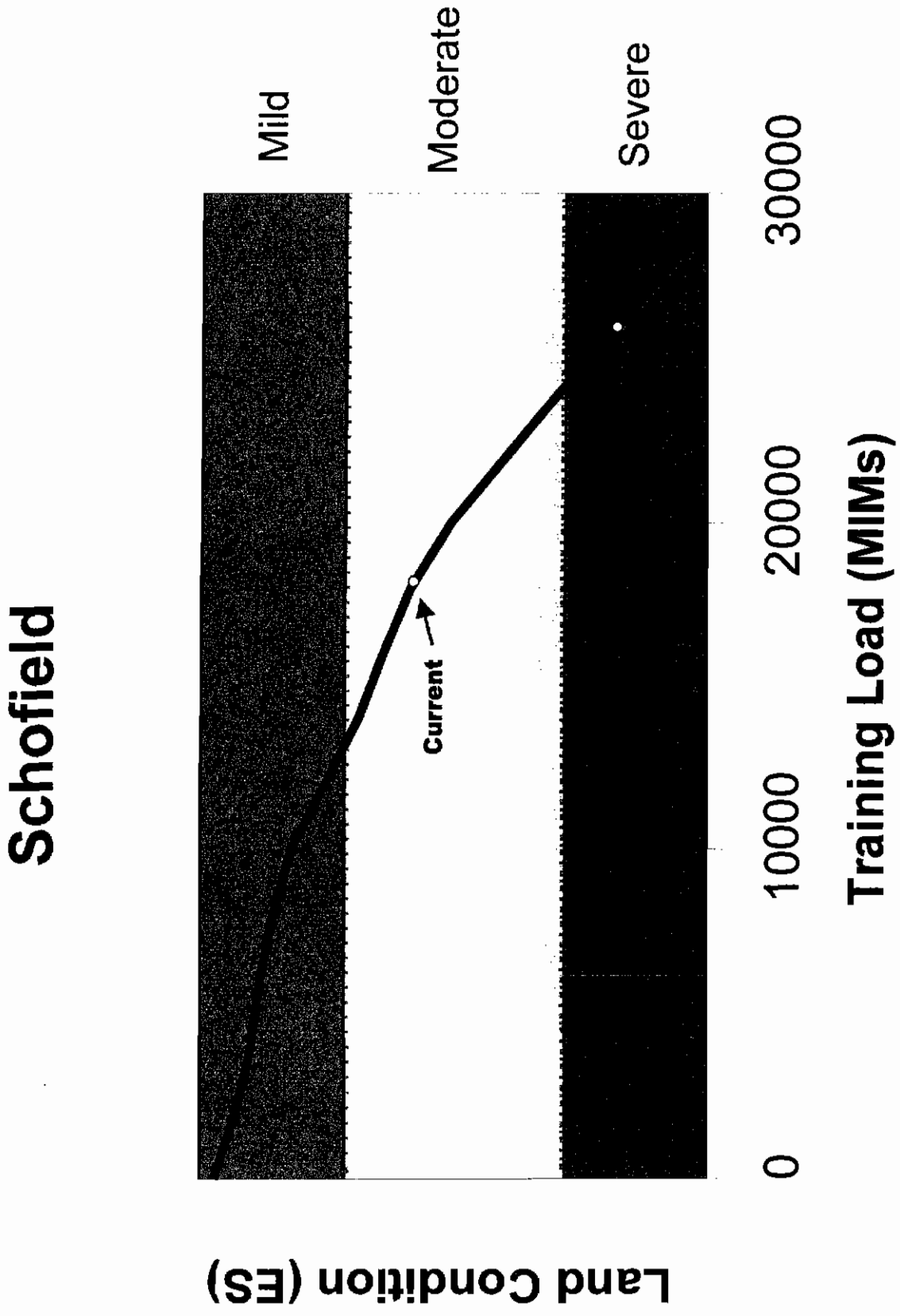
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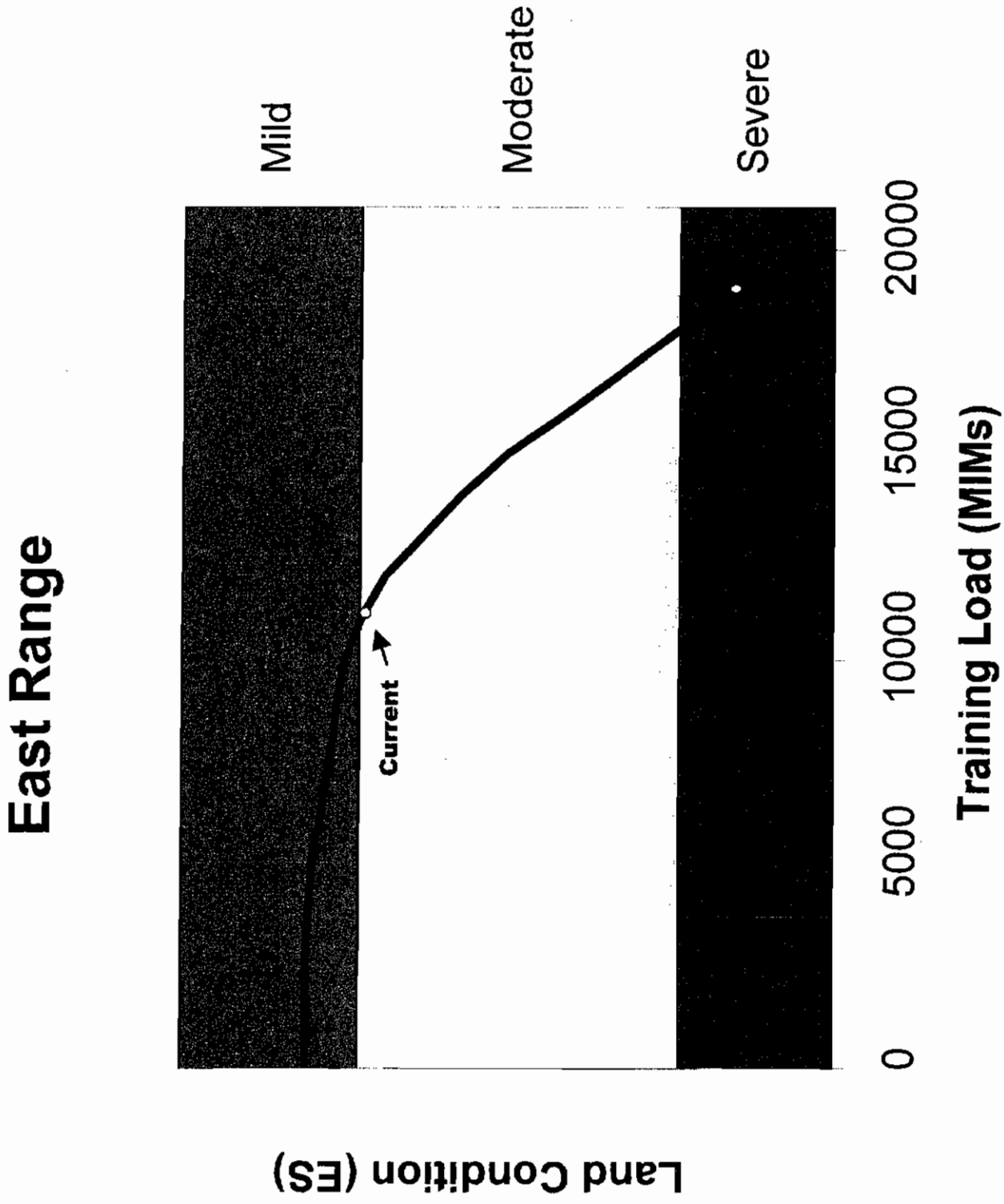
Training Load (MIMs)
Land Condition (ES)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Severe
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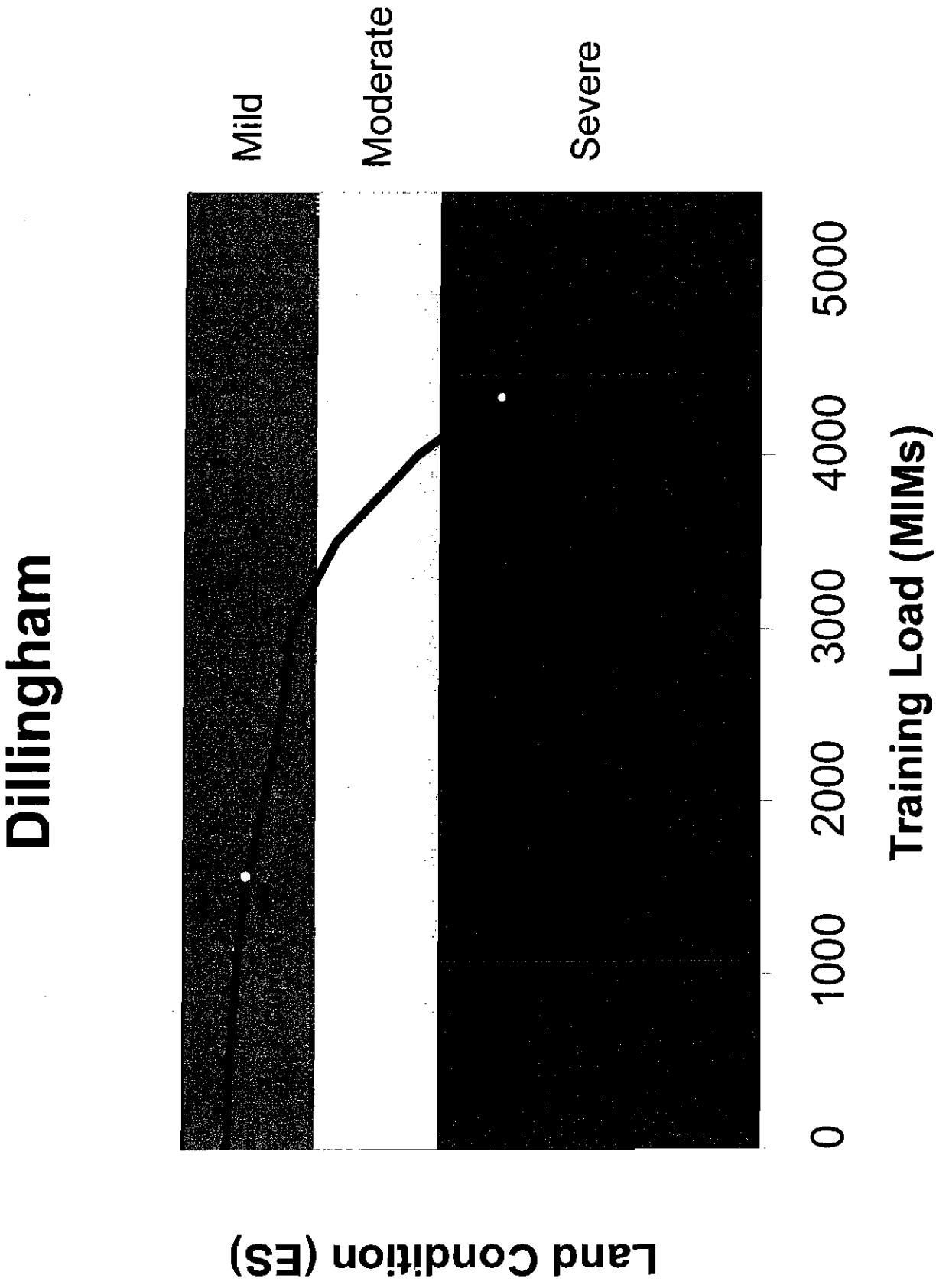
Training Load (MIMs)
Land Condition (ES)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4000
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Training Load (MIMs)
Land Condition (ES)

TITLE: Archaeological Surveys of Proposed Training Areas for the Stryker Brigade Combat Team, U.S. Army Pohakuloa Training Area, Island of Hawaii, Hawaii

AUTHOR: Roberts, Alice; Robins, Jennifer Robins; Buffum, Amy - Garcia and Associates

DATE: May 2004

ARCHAEOLOGICAL SURVEYS OF PROPOSED TRAINING AREAS FOR THE STRYKER BRIGADE COMBAT TEAM U.S. ARMY POHAKULOA TRAINING AREA, ISLAND OF HAWAII, HAWAII CONTRACT No. DACA83-01-D-0013, Task Order No. 0007

FINAL REPORT

Prepared for:

U.S. Army Engineer District, Honolulu
CEPOH-EC-E
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May 2004

GANDA

> split stone with a more or less sharp, edge...and unprovided with a handle....Probably not much use was made of Hawaiian stone knives as they are very rare.

Limited sample size of the comparative analysis (Williams 2002) has identified research problems that may be addressed in future analyses. The predominant class of recovered lithics (43.2% <1cm) may represent discarded flakes that were determined to be too small for use. The few recovered blade-like flakes that measured >10cm in length may indicate that the larger flakes were preferred and subsequently removed from both quarry and habitation sites. It is probable that similar sorting efforts were undertaken at both sites types. Additional comparative analyses of lithic assemblages from quarry and habitation sites are recommended in an effort to identify activity patterns at the sites.

One chill glass quarry complex was identified in the BAX (Site 23458); and one, an extension of Site 21670, was identified in the AALFTR.

Three basalt quarries (Sites 18675, 21304, 23559) have previously been identified at PTA. These quarries are small <34m in length, have limited debitage, and are located near the base of aa flows where veins of dense basalt are exposed (Roberts *et al.* 2002, Shapiro *et al.* 1998, Williams *et al.* 2002). One basalt quarry (Site 23465) was identified in the AALFTR.

Lithic Workshop

Five lithic workshops have been identified at PTA. Two workshops are located within site complexes (Sites 14638 and 21351); and three are isolated lithic scatters (21744, 23465, T-0207-2). Four of the sites have both chill glass and basalt debitage present, and one site (Site 21744) is limited to basalt debitage. Lithic workshops are also present at 20 repeated-use habitation sites/complexes and twelve limited-use habitation sites. Lithic scatters were also documented at three cairn complexes (Sites 21284, 21288, 21298) interpreted as ceremonial (Williams *et al.* 2002: 31, 36-37). One lithic workshop (Site 23465) was identified in the AALFTR. Lithic workshop components are also evident at habitation sites in the BAX (Sites 19490 and 23626).

Transportation

Prehistoric trails (n=11) have been identified within PTA but are primarily limited to isolated trail segments characterized by worn lava paths marked in some areas by curbstones and cairns. Small sections of the Judd Trail (Sites 5007, 5008) and a larger section of the Huālalai-Waiki'i Trail (Site 19258) have been identified at PTA. Further evidence of these major trails may be identified through additional aerial survey at PTA, which was recently successful in identifying the route of Site 19528 (Godby and Frazier in prep.). It is likely that the current road system within PTA followed earlier trails thereby obliterating evidence of those routes. Current GIS analyses show clusters of habitation sites along Redleg Trail, Bobcat Road (extension of Judd Trail) (see Figure 6).

Two trails – Site 23457 and Site 19490, Feature F – were located during survey of the BAX.

> The scale of the quarry complex indicates that the quarry was a substantial industry, and that the chill glass was not quarried for use only by bird hunters and travelers passing through the Saddle Region. The presence of the quarry complex, apparently occurring at a relatively late date in the occupation of the Hawaiian Islands and perhaps utilized within a very short span of time, will require current models of activities with the Saddle Region to be modified.

The current analyses continue to support the interpretation that even during the peak of its use, the Saddle Region was occupied on a limited basis, and site types and patterns indicate very specialized uses of the area for the procurement of resources. Analysis and charting of radiocarbon data indicate that land within PTA was first used on a very limited basis ca. AD 780 and peaked in use between 1400-1700. Occupation of sites within the Saddle Region occurred infrequently and for short durations though some sites were re-used many times. Lava tubes were preferred for repeated-use sites likely because they provide greater protection from the often-harsh environment and provided water catchment opportunities. Lava fields were likely modified to increase the habitat of the *`ua`u*, the remains of which are commonly recovered from archeological sites. Quarrying of chill glass began some time after AD 1520 and was probably a primary activity in the area thereafter, though the subsequent use and regional distribution of the lithic materials remains unclear.

2.7 Field Methods

A pedestrian survey was conducted along transects spaced at 15-30m intervals over 100% of the BAX and AALFTR study areas with the exception of the 1843 flow where sample transects were conducted. Transect interval was dictated by ground visibility, flow type (i.e. broader transects in aa), and potential for containing cultural resources. The field crew was escorted by UXO specialists in the BAX and AALFTR because of hazards associated with unexploded ordnance as determined by the USAED OE Specialist and U.S. Army Range Control.

All identified sites were briefly described and sketched on standard site and feature record forms. UTM coordinates were collected for the identified sites using a Pathfinder Pro XR global positioning system; the coordinates were subsequently corrected using the Upolo Point base station. All sites were photographed using both 35-mm and digital cameras and each photo was recorded on a photo log. Aspects of the field work were recorded in a daily log (e.g., personnel and time expenditures, study area descriptions and site inventory). No subsurface testing of the sites was performed as part of the current project.

2.8 Battle Area Complex (BAX) - Project Results

Eight pre-Contact Hawaiian sites were documented during the archaeological survey of the BAX study area (Table 4, Figures 9-10). One of the eight sites, Site 19490, was previously recorded and determined to be eligible for National Register of Historic Places (NRHP) listing under Criterion D (Shapiro and Cleghorn 1998). All other sites identified in the BAX are also considered potentially eligible for listing in the NRHP under Criterion D, as per 36CFR60.4.

Table 4. Sites Identified in the BAX Study Area.

SHPO #	Fea. #	Temp #	Site Type	Function	Flow	Training Area	Recommendations
19490		2	Habitation complex	Repeated-Use Habitation	I	5	Testing/ Preservation
23455	151-161	607-615, 689	Excavated pit complex	Bird Nesting	k2	5	No further work
23456		605	Enclosure	Limited-use Occupation	I	5	Map/Test
23457		616	Trail	Transportation	k2	7	Archival
23458	1 - 12	650-656, 672-676	Chill glass quarry complex	Quarry	k4	Impact Area	Map
23462		670	Cairn	Marker	I	7	Map
23621	1 - 18	657-659, 664-666, 669, 677-679, 681-688	Excavated pit complex	Bird Nesting	k2	Impact Area	Map Sample
23626		904	Lava tube	Repeated-Use Habitation	k2	Impact Area	Map/Test

2.8.1 BAX Site Descriptions

SHPO Site No.: 19490 **GANDA Site No.:** t2
Site Type: Habitation Complex
Function: Repeated-Use Habitation
Affiliation: Pre-Contact Hawaiian
No. of Features: 11
Site Size: 150m by 170m
Cultural Material: See Table 1
Recommendation: Phase II (test)/Possible Preservation
Description: Site 19490 consists of eleven features. Of particular interest is Feature C, a lava tube shelter (Figure 11), which contained substantial deposit and cultural materials suggesting repeated habitation at the site. Table 5 summarizes the Site 19490 features as documented by Shapiro and Cleghorn (1998: 43-53). A 1m by 1m unit will be excavated in the Feature C lava tube as part of Phase II research.

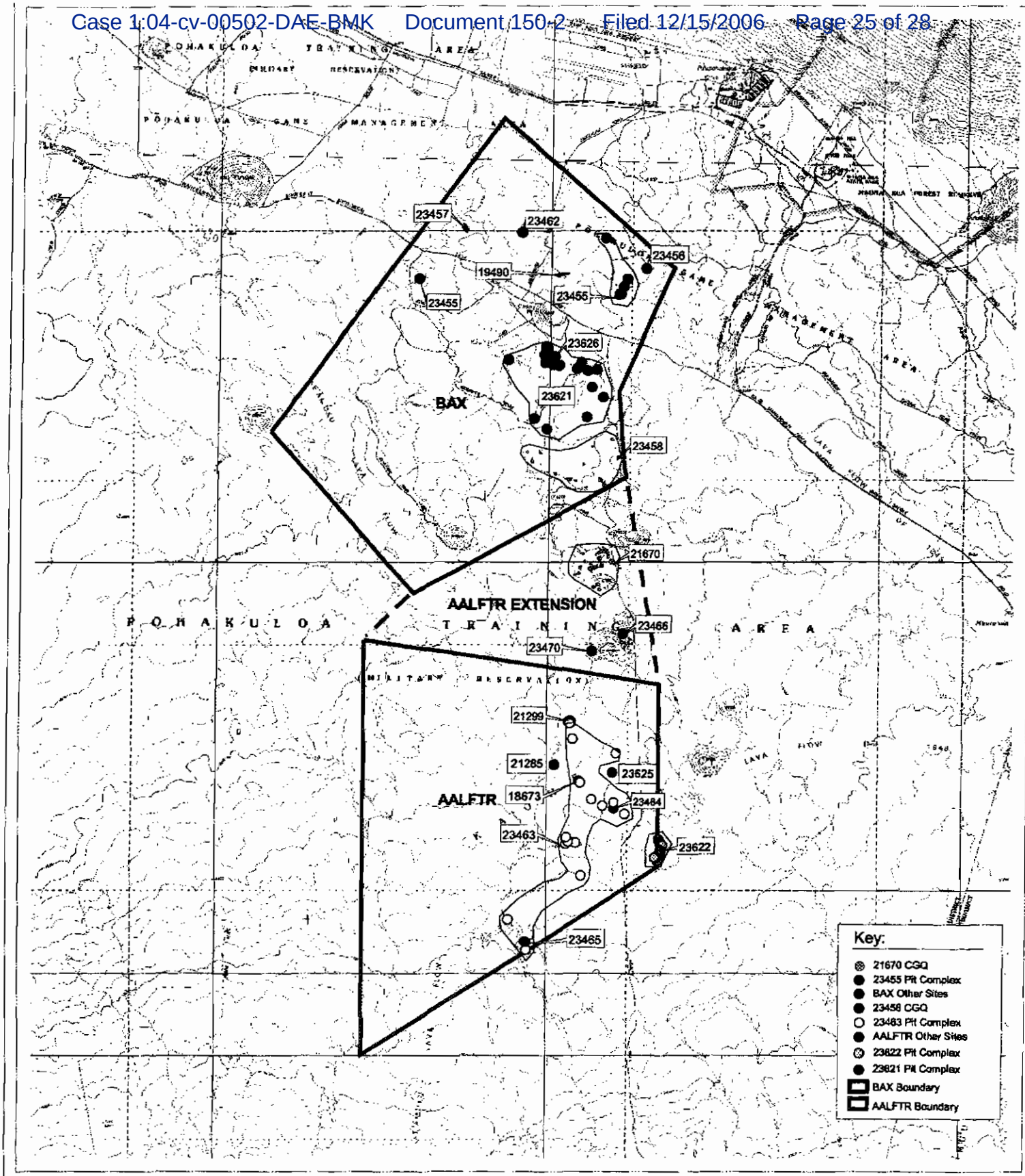

Figure 9. Digital USGS Pu`u Koli Quad Showing BAX and AALFTR Study Areas and Site Locations.

SHPO Site No.: 23621
GANDA Site No.: 657-659, 664, 666, 669, 677-679, 681-688
Site Type: Excavated Pit Complex
Function: Possible Bird Nesting
Affiliation: Pre-Contact Hawaiian
No. of Features: 18 (representing over 80 excavated pits)
Site Size: Unknown
Cultural Material: A single hammerstone associated with Feature 16.
Recommendation: Phase II (map representative sample)
Description: Site 23621 is an excavated pit complex composed of 18 features and 80+ discrete pits of various size, 18 of which were located with GPS. A photograph of a representative pit is provided in Figure 17.

- Feature 1 is a single, excavated pit that measures 1.5m by 0.45m.
- Feature 2 consists of 10+ pits.
- Feature 3 is a series of 5+ pits.
- Feature 4 is composed of 10+ pits.
- Feature 5 is a single, excavated pit.
- Feature 6 consists of 4 excavated pits.
- Feature 7 is composed of 10+ pits.
- Feature 8 is a series of 3+ pits within an area measuring c. 100m².
- Feature 9 consists of 3 pits within an area measuring 50m².
- Feature 10 is 2 pits within an area measuring c. 100m².
- Feature 11 includes 3 excavated pits over a 50m² area.
- Feature 12 is a single pit.
- Feature 13 is made up of 10 pits within an area measuring c. 900m².
- Feature 14 contains 7 excavated pits within an area measuring c. 200m².
- Feature 15, measuring approximately 12m² in area, is composed of two pits.
- Feature 16 is composed of two pits within an area measuring c. 130m². A single hammerstone was observed at this site.
- Feature 17 is a series of 4 pits within an area measuring c. 200m².
- Feature 18 is composed of 3 pits, one large and two small, within an area measuring c. 250m².

SHPO Site No.: 23462 **GANDA Site No.:** 670
Site Type: Cairn
Function: Marker
Affiliation: Undetermined
No. of Features: 1
Site Size: 2.1m x 1.9m x 0.9m
Cultural Material: none observed
Recommendation: Phase II (map)
Description: Site 23462 is a sizeable cairn situated amidst an aa flow (Figure 18). Modern debris litters the area. A military marker was observed in area.

SHPO Site No.: 23626 **GANDA Site No.:** 904
Site Type: Lava tube
Function: Habitation
Affiliation: Pre-Contact Hawaiian
No. of Features: 2
Site Size: 12m x 4m
Cultural Material: *ti* leaf sandal, matting
Recommendation: Phase II (map/test)
Description: Site 23626 is a pahoehoe sink with a lava tube and constructed C-shape (Figure 19). The lava tube extends from the southeastern side of the sink. The tube is at least 6 m long by 1m high at the opening. A *ti* leaf sandal (stashed in the rocks on the west side of the opening), grass matting, and bird bone, were all observed within the lava tube. A 0.5 by 0.5m unit will be excavated within Feature 1 as part of Phase II research.

Feature 2 is a C-shape wall constructed against the edge of the sink and a small overhang. The wall measures 1.8 m long by 0.9m wide. Charcoal was observed beneath the overhang. Two 0.5x0.5m units will be excavated as part of Phase II research.

Figure 19. Photograph of Site 23626

4.8 PTA Trail Discussion and Conclusions

The few sites identified in PTA Trail consist of historic sites associated with the Kawaihae-Waimea road and ranching operations.

Numerous pre-Contact habitation and burial sites were previously recorded outside of the current 30-m ROW of the Lower PTA Trail (see Barrera and Kelly 1974) and similar site types were observed during the current survey on adjacent ridge tops. This low density of sites identified in the Lower PTA Trail is clearly the result of the limited 30-m-wide survey corridor and extent of ground disturbance to the corridor because of construction and use of the existing tank trail. Therefore, if the Lower PTA Trail is re-routed in any way beyond the 30-m-surveyed corridor, additional archaeological survey will be required. Use of the existing Lower PTA Trail, as studied, is recommended to avoid affecting significant cultural resources.

5.0 RECOMMENDATIONS

Archaeological reconnaissance for proposed Stryker Brigade Combat Team Projects at U.S. Army Pohakuloa Training Area (PTA) and associated lands, Island of Hawai'i (DACA83-01-D-0013, T.O.7) identified:

- PTA-BAX –eight (8) pre-Contact Hawaiian sites.
- PTA-AALFTR -nine (9) pre-Contact Hawaiian sites, and two (2) historic sites.
- WPAA – six (6) probable pre-Contact Hawaiian sites; sixty (60) post-Contact sites, and six (6) sites with an undetermined age.
- PTA Trail – seven (7) historic sites.

All sites in the BAX study area are considered potentially eligible for listing in the National Register of Historic Places (NRHP) under Criterion D, as per 36CFR60.4. With the exception of Site 23455, a site for which adequate data has been collected, all sites in the BAX study area are recommended for Phase II inventory-level research and evaluation (see Table 4 for specific site recommendations).

All sites in the AALFTR study area are considered eligible for listing in the National Register of Historic Places (NRHP) under Criterion D, as per 36CFR60.4, and are recommended for Phase II inventory-level research and evaluation (see Table 7 for specific site recommendations).

All sites in the WPAA are considered potentially eligible for listing in the NRHP under Criteria A, C and D, as appropriate, as per 36CFR60.4. With the exception of the cairn/marker sites, for which adequate data have been collected, all sites in the WPAA study area are recommended for Phase II inventory-level research and evaluation (see Table 8 for specific site recommendations).

All of the sites in the PTA Trail easement are considered potentially eligible for listing in the NRHP under Criteria A and D, as appropriate, as per 36CFR60.4, and are recommended for Phase II inventory-level research and evaluation (see Table 9 for specific site recommendations).